National Institute of Environmental Health Sciences

Some like it cold: Microbial transformations of mercury in polar regions

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Abstract:

The contamination of polar regions with mercury that is transported from lower latitudes as inorganic mercury has resulted in the accumulation of methylmercury (MeHg) in food chains, risking the health of humans and wildlife. While production of MeHg has been documented in polar marine and terrestrial environments, little is known about the responsible transformations and transport pathways and the processes that control them. We posit that as in temperate environments, microbial transformations play a key role in mercury geochemical cycling in polar regions by: (1) methylating mercury by one of four proposed pathways, some not previously described; (2) degrading MeHg by activities of mercury resistant and other bacteria; and (3) carrying out redox transformations that control the supply of the mercuric ion, the substrate of methylation reactions. Recent analyses have identified a high potential for mercury-resistant microbes that express the enzyme mercuric reductase to affect the production of gaseous elemental mercury when and where daylight is limited. The integration of microbially mediated processes in the paradigms that describe mercury geochemical cycling is therefore of high priority especially in light of concerns regarding the effect of global warming and permafrost thawing on input of MeHg to polar regions.

Source: http://dx.doi.org/10.3402/polar.v30i0.15469

Resource Description

Communication: ☑

resource focus on research or methods on how to communicate or frame issues on climate change; surveys of attitudes, knowledge, beliefs about climate change

A focus of content

Communication Audience: ☑

audience to whom the resource is directed

Researcher

Exposure : ☑

weather or climate related pathway by which climate change affects health

Food/Water Quality

Food/Water Quality: Other Food Quality

Food Quality (other): Methylmercury

Geographic Feature: ☑

resource focuses on specific type of geography

Arctic

Geographic Location: ☑

resource focuses on specific location

Global or Unspecified

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Neurological Effect

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Resource Type: ☑

format or standard characteristic of resource

Review

Timescale: ☑

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content